



## Experiment 7

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### 1. Aim:

To design and implement Java programs using JDBC connectivity, CRUD operations, and MVC architecture for database interaction and management.

- To apply JDBC concepts, transaction handling, and MVC design pattern for real-world data management applications.

#### **Part A – Easy Level:**

- To create a Java program that connects to a MySQL database and retrieves all records from the Employee table.
- To demonstrate database connectivity using DriverManager and Connection objects.

#### **Part B – Medium Level:**

- To develop a Java program that performs CRUD operations on a Product table using JDBC.
- To implement transaction handling for ensuring data consistency during database operations.

#### **Part C – Hard Level:**

- To build a Java application using MVC architecture for managing student data through JDBC.
- To separate Model, View, and Controller functionalities and perform CRUD operations efficiently.

### 2. Objective:

- ✓ To understand and implement **JDBC connectivity** for accessing relational databases.



- ✓ To perform Create, Read, Update, and Delete (CRUD) operations using JDBC.
- ✓ To apply transaction management for maintaining database integrity.
- ✓ To design applications using the MVC architecture for modular and maintainable code.
- ✓ To handle SQL exceptions and manage JDBC resources effectively..

### 3. JAVA script and output:

#### EASY-LEVEL PROBLEM

```
package exp.pkg6;
```

```
import java.sql.*;
```

```
public class Exp6 {
```

```
    public static void main(String[] args) {
```

```
        try {
```

```
            Class.forName("com.mysql.cj.jdbc.Driver");
```

```
            Connection con = DriverManager.getConnection("jdbc:mysql://localhost:3306/college",  
"root", "password");
```

```
            Statement stmt = con.createStatement();
```

```
            ResultSet rs = stmt.executeQuery("SELECT * FROM Employee");
```

```
            while (rs.next()) {
```

```
                System.out.println("EmpID: " + rs.getInt(1) + ", Name: " + rs.getString(2) + ", Salary:  
" + rs.getDouble(3));
```

```
            }
```

```
            con.close();
```

```
        } catch (Exception e) {
```

```
            System.out.println(e);
```



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```
    }  
}  
}
```

## SAMPLE OUTPUT:

EmpID: 101, Name: Akshara, Salary: 50000

EmpID: 102, Name: Ishika, Salary: 60000

## MEDIUM LEVEL PROBLEM:

```
package exp.pkg6;  
  
import java.sql.*;  
import java.util.*;  
  
public class Exp6 {  
    public static void main(String[] args) {  
        Scanner sc = new Scanner(System.in);  
        try {  
            Class.forName("com.mysql.cj.jdbc.Driver");  
            Connection con = DriverManager.getConnection("jdbc:mysql://localhost:3306/college",  
"root", "password");  
            while (true) {  
                System.out.println("Menu:\n1. Add Product\n2. View All Products\n3. Update  
Product\n4. Delete Product\n5. Exit");  
                System.out.print("Enter your choice: ");  
                int choice = sc.nextInt();  
                sc.nextLine();  
                if (choice == 1) {  
                    System.out.print("Enter ProductID: ");  
                    int id = sc.nextInt();  
                    sc.nextLine();  
                    System.out.print("Enter Product Name: ");
```



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```
String name = sc.nextLine();
System.out.print("Enter Price: ");
double price = sc.nextDouble();
System.out.print("Enter Quantity: ");
int qty = sc.nextInt();
PreparedStatement ps = con.prepareStatement("INSERT INTO Product VALUES
(?, ?, ?, ?)");
ps.setInt(1, id);
ps.setString(2, name);
ps.setDouble(3, price);
ps.setInt(4, qty);
ps.executeUpdate();
System.out.println("Product added successfully!");
} else if (choice == 2) {
    Statement stmt = con.createStatement();
    ResultSet rs = stmt.executeQuery("SELECT * FROM Product");
    while (rs.next()) {
        System.out.println("ID: " + rs.getInt(1) + ", Name: " + rs.getString(2) + ", Price: "
+ rs.getDouble(3) + ", Quantity: " + rs.getInt(4));
    }
} else if (choice == 3) {
    System.out.print("Enter ProductID to update: ");
    int id = sc.nextInt();
    System.out.print("Enter new Price: ");
    double price = sc.nextDouble();
    PreparedStatement ps = con.prepareStatement("UPDATE Product SET Price=?
WHERE ProductID=?");
    ps.setDouble(1, price);
    ps.setInt(2, id);
    ps.executeUpdate();
    System.out.println("Product updated successfully!");
} else if (choice == 4) {
    System.out.print("Enter ProductID to delete: ");
    int id = sc.nextInt();
    PreparedStatement ps = con.prepareStatement("DELETE FROM Product WHERE
ProductID=?");
    ps.setInt(1, id);
    ps.executeUpdate();
    System.out.println("Product deleted successfully!");
} else if (choice == 5) {
```



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```
        System.out.println("Exiting...");
        break;
    } else {
        System.out.println("Invalid choice!");
    }
}
con.close();
} catch (Exception e) {
    System.out.println(e);
}
}
```

## **SAMPLE OUTPUT:**

Menu:

1. Add Product
2. View All Products
3. Update Product
4. Delete Product
5. Exit

Enter your choice: 1

Product added successfully!

## **HARD LEVEL PROBLEM**

```
package exp.pkg6;
```

```
import java.sql.*;
```

```
import java.util.*;
```

```
class Student {
```

```
    int id;
```

```
    String name;
```

```
    String dept;
```



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double marks;

```
Student(int id, String name, String dept, double marks) {  
    this.id = id;  
    this.name = name;  
    this.dept = dept;  
    this.marks = marks;  
}  
  
}  
  
class StudentController {  
    Connection con;  
  
    StudentController() throws Exception {  
        Class.forName("com.mysql.cj.jdbc.Driver");  
        con = DriverManager.getConnection("jdbc:mysql://localhost:3306/college", "root",  
"password");  
    }  
  
    void addStudent(Student s) throws Exception {  
        PreparedStatement ps = con.prepareStatement("INSERT INTO Student VALUES (?, ?, ?,  
?);");  
        ps.setInt(1, s.id);  
        ps.setString(2, s.name);  
        ps.setString(3, s.dept);  
        ps.setDouble(4, s.marks);  
        ps.executeUpdate();  
    }  
}
```



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```
}
```

```
void viewAll() throws Exception {
```

```
    Statement stmt = con.createStatement();
```

```
    ResultSet rs = stmt.executeQuery("SELECT * FROM Student");
```

```
    while (rs.next()) {
```

```
        System.out.println("StudentID: " + rs.getInt(1) + ", Name: " + rs.getString(2) + ",  
Department: " + rs.getString(3) + ", Marks: " + rs.getDouble(4));
```

```
    }
```

```
}
```

```
void updateStudent(int id, double marks) throws Exception {
```

```
    PreparedStatement ps = con.prepareStatement("UPDATE Student SET Marks=? WHERE  
StudentID=?");
```

```
    ps.setDouble(1, marks);
```

```
    ps.setInt(2, id);
```

```
    ps.executeUpdate();
```

```
}
```

```
void deleteStudent(int id) throws Exception {
```

```
    PreparedStatement ps = con.prepareStatement("DELETE FROM Student WHERE  
StudentID=?");
```

```
    ps.setInt(1, id);
```

```
    ps.executeUpdate();
```

```
}
```

```
}
```



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```
public class Exp6 {  
    public static void main(String[] args) {  
        try {  
            StudentController sc = new StudentController();  
            Scanner in = new Scanner(System.in);  
            while (true) {  
                System.out.println("--- Student Management System ---");  
                System.out.println("1. Add Student\n2. View All Students\n3. Update Student\n4.  
Delete Student\n5. Exit");  
                System.out.print("Enter your choice: ");  
                int ch = in.nextInt();  
                if (ch == 1) {  
                    System.out.print("Enter ID: ");  
                    int id = in.nextInt();  
                    in.nextLine();  
                    System.out.print("Enter Name: ");  
                    String name = in.nextLine();  
                    System.out.print("Enter Department: ");  
                    String dept = in.nextLine();  
                    System.out.print("Enter Marks: ");  
                    double marks = in.nextDouble();  
                    sc.addStudent(new Student(id, name, dept, marks));  
                    System.out.println("Student added successfully!");  
                } else if (ch == 2) {  
                    sc.viewAll();  
                } else if (ch == 3) {  
                    System.out.print("Enter ID to update: ");
```





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```
        int id = in.nextInt();
        System.out.print("Enter new Marks: ");
        double marks = in.nextDouble();
        sc.updateStudent(id, marks);
        System.out.println("Student updated successfully!");
    } else if (ch == 4) {
        System.out.print("Enter ID to delete: ");
        int id = in.nextInt();
        sc.deleteStudent(id);
        System.out.println("Student deleted successfully!");
    } else if (ch == 5) {
        System.out.println("Exiting...");
        break;
    } else {
        System.out.println("Invalid choice!");
    }
}
} catch (Exception e) {
    System.out.println(e);
}
}
```

## **SAMPLE OUTPUT:**

--- Student Management System ---

1. Add Student
2. View All Students



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3. Update Student

4. Delete Student

5. Exit

Enter your choice: 2

StudentID: 1001, Name: Akshara, Department: CSE, Marks: 98